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LORD ARMSTRONG ON TECHNICAL EDUCATION.

LORD ARMSTRONG, in his article in the July number of the *Nineteenth Century*, brings forward ideas which, he tells us, have long been incubating in his mind, and which he believes to be in accord with those of many employers of labour who, like himself, are engaged in manufacturing pursuits affording scope for the application of technical knowledge. A more unfortunate exposition could not have been addressed to the public at a time when so many are earnestly striving to impress upon the nation the importance of scientific training to the well-being of the people. It is not that we do not cordially agree with Lord Armstrong in many of his remarks; what we object to is the indefinite and vague character of his judgments generally, and the want of logic which characterizes many of his criticisms and recommendations: in every paragraph almost we recognize that we are reading the words of a true representative of that remarkable genus, the "practical" Englishman, who undoubtedly has been the glory of his race in the past, but threatens to be its destruction in the near future. But so outspoken a refusal to recognize the altered conditions of the times, by one who occupies the highest position among engineers, unfortunately affords clear evidence that we are making but little progress towards "organizing victory" in that great industrial war of which Huxley spoke in his memorable and incisive letter to the *Times* early in 1887, in words of deepest import, which unquestionably should serve to guide us *pace* Lord Armstrong's avowal: "As to whether our commerce is to be saved from the effects of foreign competition by a wide diffusion of technical knowledge, I have no faith in any such safeguard." In contrast with this is Huxley's emphatic warning:—"I do not think I am far wrong in assuming that we are entering, indeed have already entered, upon the most serious struggle for existence to which this country has ever been committed; and the latter years of the century promise to see us embarked in an industrial war of far more serious import than the military wars of its opening years. On the east, the most systematically instructed and best informed people in Europe are our competitors; on the west, an energetic offshoot of our own stock, grown bigger than its parent, enters upon the struggle possessed of natural resources to which we can make no pretension, and with every prospect of soon possessing that cheap labour by which they may be effectually utilized." Surely we shall elect to follow Huxley's advice offered to us in the sentence, "Many circumstances tend to justify the hope that we may hold our own if we are careful to organize victory," and we shall not be content to rely on a sufficient number of self-educated men of genius being spontaneously forthcoming to supply the nation's needs: indeed there can be no doubt that in the course of a generation or two—if we can maintain our existence unimpaired so long—every effort will be made to develop the faculties of each member of the community as fully as circumstances will permit; but unless some grievous reverse of fortune should lead the nation suddenly to realize its position, we sadly fear that the cause of educational progress has too many lukewarm adherents, holding views similar to those expressed by Lord Armstrong, for it to make much immediate progress.

Lord Armstrong says very truly that, although there is at the present time a great outcry for technical education, very few people have any distinct idea of what they mean when they use that term, or any definite opinion either as to the class of persons who will be chiefly benefited by it, or as to the time of life at which it ought to be acquired. Speaking of the meeting recently held at the Mansion House respecting the scheme for establishing Polytechnic Institutes in London, he remarks also that the speeches then delivered were rather vague and indefinite as speeches on technical education generally are; and he points out that, by using the more comprehensive phrase secondary instead of technical education, Lord Salisbury avoided the troublesome but not unnecessary task of framing a correct definition. But it may with equal truth be said of Lord Armstrong that he, like most writers on technical education, is indefinite and vague; and he also makes no attempt to give a definition of technical education. In fact, his article is nothing more than a discursive essay on the subject of popular education generally, excluding moral and religious questions.

The vagueness which characterizes the utterances of most speakers and writers on technical education is undoubtedly the outcome of the peculiarly English practice which permits men to speak with authority who have no claim whatever to be heard on the subject, and which leads us to put aside those who really are experts as of no account. The work has fallen almost entirely into the hands of philanthropists and politicians, and inquiries into the subject have been handed over to men whose qualifications for the work in too many cases would have been regarded in any other country but England as lamentably insufficient. At the recent meetings at the Society of Arts and the Mansion House there was a conspicuous absence of nearly all those who are known to have been most active in carrying on the real work of technical education and who are able to speak from experience. Yet, if the public are to be properly informed and guided, and if the politicians are to be instructed in their duties, it is imperative that others besides the ornamental and amateur members of the body of technical educators should be summoned to assist in the movement.

The *Times*, in a recent article on Lord Hartington's speech at the meeting of the Association for the Promotion of Technical Education, has very properly called attention to the importance of an accurate definition of the term technical education, pointing out that if it means that kind of education which bests fits a man both mentally and bodily for technical pursuits requiring skill and intelligence the proposition that technical education is a good thing is self-evident; but that if it means a particular method of imparting knowledge on technical subjects then it is open to many of the criticisms passed on it by Lord Armstrong. Probably the majority of the public are at present of opinion that to technically educate a youth is to teach him his business—that technical education is the modern equivalent of the now

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effete apprenticeship system. This came out very clearly in the late discussion with reference to the introduction of manual training into schools, to which objection was made by many artisans, who urged, among other things, that if such instruction were given it should be imparted by skilled artisans and not by the teachers—entirely failing to realize that it was sought to introduce manual training with an educational object, for the purpose of cultivating a faculty hitherto left untrained, and not for the purpose of teaching a trade. Authorities, however, we believe, are mostly of opinion that to technically educate a youth is to teach him to understand and scientifically follow his business, and they consider that only so much of the actual practice should be learnt by the student who is being technically educated as will suffice to afford the necessary insight into the principles on which the practice is founded. Thus, medical men have long been technically educated: they have not only learnt the practice of their profession, but have also devoted a large amount of time to the study of the facts and scientific principles on which medical practice is based, and the demands upon them in this latter direction have been much increased within recent years. Engineers and architects, on the other hand, hitherto have generally not been technically educated: entering the workshop or office, they have been left to acquire as they best might a knowledge of the scientific principles underlying their professions, their attention having been almost entirely devoted to acquiring manipulative skill and a knowledge of constructive details.

It is difficult to understand what meaning Lord Armstrong attaches to the term technical education. He tells us that the question "What is the use of useful knowledge?" appears to him to present in a quaint form a theme of a very debatable nature! He then proceeds to argue that success in the world depends on the possession of genius; knowledge—well, is of no particular consequence! "Many people imagine that genius is kept down from want of knowledge, and that in many cases it is thus lost to the world. This I entirely dispute. Genius is irrepressible, and revels in overcoming difficulties." But even the genius must find his opportunity, and—nowadays at least—must be possessed of sufficient knowledge to be able to take advantage of the opportunity when found. Moreover, as the world progresses, opportunities are not found to be increasingly numerous in proportion to the growth of the population, nor do the problems diminish in difficulty; and no reliance can be placed upon the supply of genius keeping pace with the demand.

Lord Armstrong thinks that the well-known dictum that if the Romans had had to learn Latin they never would have conquered the world, is suggestive of what our loss might have been if self-made engineers such as Watt, George Stephenson, Smeaton, Brindley and Telford, had frittered away their energies upon inappropriate studies forced upon them at school; and that generals such as Wellington and Marlborough, or naval commanders such as Nelson and Blake, would not have directed the armies and navies of England with more effect if book knowledge had been crammed into them at school. But to argue in this manner is to entirely pervert the theme of technical education: the whole object of its advocates being so to improve the entire educational machine that all inappropriate studies may be eliminated from the school course, and every provision made for developing and strengthening the faculties generally; and even Lord Armstrong admits that as "cheapness of production and superiority of quality will decide the victory in the race of competition, we shall improve our chance of maintaining a foremost place if by early training we develop the mental and bodily faculties of our people." His subsequent words, however, "but not, I think, by any forced or indiscriminate system of imparting knowledge," are simply incomprehensible, as no one has suggested the introduction of any "forced and indiscriminate system"; in fact, this is only one of the many cases in which Lord Armstrong sets up an image of his own creation, and at once hastily destroys it. When he tells us that he does not "undervalue technical knowledge voluntarily acquired as a means to an end, but it is the brain-workers and not the hand-workers who will seek to attain it and benefit by it," he entirely overlooks the fact that one great object of technical education is to associate brains with hands and hands with brains.

We have no space left to discuss Lord Armstrong's extraordinary views with reference to existing facilities for the acquisition of technical knowledge and their sufficiency. But we must call attention to his contention "that when Colleges can be established by public subscription or private munificence, they are worthy of approval and commendation; but where the State or local governing bodies have to furnish money for education in relation to national industry, they must look to attaining the required results at the least possible expense, and I am inclined to look upon Colleges as luxuries in education rather than necessaries." In marked contrast to this is a statement made by Sir Henry Roscoe in the discussion on Mr. Swire Smith's paper on the Technical Education Bill, read at the Society of Arts in February last. Speaking of what the Swiss were doing, Sir Henry related how, a few years ago, when it was proposed to spend £24,000 on the erection of a new chemical department of the Zurich Polytechnicum, some of the Bundesrath were a little startled and rather objected to paying so large a sum, and there was accordingly in Berne some opposition; but the Minister of Education pointed out that the amount of money which had already been received by Switzerland from the men who had studied in the Polytechnic School at Zurich had amounted to ten times over the sum he was asking for, and he was sure that the money would be well spent, and in a short time recouped. The Swiss, at all events—let alone the Germans—therefore do not look upon Colleges as luxuries rather than necessaries; and we are assured that if comparison were made of the work done by chemists in Swiss laboratories with that done by English chemists, the result would not be to the credit of our country. We should like Lord Armstrong to tell us—is he, or is he not, content to see this country remain on a lower intellectual footing than Switzerland?

Great as is Lord Armstrong's reputation as a mechanical engineer, we trust that few will regard him as an "unimpeachable authority" in the matter of technical education: if the majority remain much longer of his opinion, then is the fate of our nation sealed.

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